

An Optimal Vowel System for Japanese ELF Learners

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1. Introduction

English teachers should explicitly indicate the number of segments that their students must distinguish in order to convey the meaning of different words. However, the number has not been revealed to Japanese students partly because the English vowel system is not stable. In fact, the number of simplex vowels has recently been reduced in General American (hereafter GA) because of merger between /ɔ/ and /ɑ/. While GA exhibits a nine-phoneme system of simplex vowels, current British English contains separate systems of six short and six long vowels. In this paper, we consider which vowel system is more intelligible and learnable for Japanese students of English as a lingua franca (henceforth ELF).

British pronunciation of simplex vowels is more learnable than American for Japanese ELF learners, because the former contains separate vowel systems which can be distinguished by the phonetic feature [\pm long]. This feature is more intelligible than [\pm tense] for Japanese students who distinguish long vowels from short vowels in their first language. On the other hand, British pronunciation of complex vowels is less learnable than American for Japanese students, because the former system of complex vowels includes centering diphthongs which are not present in GA.

2. Japanese Vowel System

It is generally assumed that the Japanese language has a system of five distinct vowels.

(1) Japanese vowel system¹⁾

i	u
e	o
a	

Since each vowel contrasts with a long vowel, Vance (2008: 56–57) suggests a possibility that the language has ten distinct vowels as follows:

(2) Short/long vowel contrasts in Japanese

/i/ [biɾu] ‘building’	/i:/ [bi:ɾu] ‘beer’
/e/ [deɾa] ‘exited’	/e:/ [de:ɾa] ‘data’

/a/ [kado] ‘corner’	/a:/ [ka:do] ‘card’
/o/ [koto] ‘koto’	/o:/ [ko:to] ‘coat’
/u/ [kuro] ‘black’	/u:/ [ku:ro] ‘air route’

The Japanese vowel distinctions illustrated above depend entirely on length, and their contrasts can be described in terms of the distinctive feature $[\pm\text{long}]$.

Although Vance (2008: 57) states that the Japanese vowel length distinctions do not have a very high functional load, native speakers of Japanese can easily find another set of minimal pairs based on the vowel length distinctions as follows:

(3) Vowel length contrasts in Japanese

/i/ [čizu] ‘map’	/i:/ [či:zu] ‘cheese’
/e/ [meši] ‘cooked rice’	/e:/ [me:ši] ‘business card’
/a/ [kaki] ‘persimmon’	/a:/ [ka:ki] ‘khaki’
/o/ [koi] ‘love’	/o:/ [ko:i] ‘affection’
/u/ [ɸurin] ‘illicit affair’	/u:/ [ɸu:rin] ‘wind-bell’

Among the prosodic features — duration, pitch, and intensity — duration is not available for Japanese word accent because vowel length is contrastive as shown above, while English word accent can be realized by syllable length even when high pitch is suppressed by low tone of rising intonation.

3. GA Vowel System

It is supposed that Japanese ELF learners should acquire the pronunciation of GA. Native speakers of the dialect distinguish the following nine simplex vowels after the above-mentioned merger of the lower mid back vowel /ɔ/ with the low back unrounded /ɑ/.

(4) GA simplex vowels

i		u
ɪ	ə	ʊ
ε	Λ	
æ		ɑ

Unlike Japanese, the simplex vowels in (4) do not have their long counterparts. The high vowels /ɪ/ and /ʊ/ differ in quality from /i/ and /u/ respectively, and their contrasts can be described in terms of the distinctive feature $[\pm\text{tense}]$. Although $[+\text{long}]$ usually accompanies the tense vowels as a redundant feature, it is not distinctive in GA.

In a historical point of view, however, the high tense vowels /i/ and /u/ could be included in the system of complex vowels as follows:

(5) GA complex vowels

i	u
e	o
	ɔ
a	ʌ

The complex vowels in (5) have come from Middle English long vowels except for /ɔ:/: according to Wells (1982: 150–151), all words containing the diphthong /ɔ:/ are believed to be ultimately loan words, mainly from Old French. If the high tense vowels /i/ (= /i:/) and /u/ (= /u:/) are excluded from the system of simplex vowels and included in the system of complex vowels, GA exhibits systems of seven simplex and seven complex vowels. The GA system of complex vowels is more stable than that of British English in the sense that each diphthong preserves its output of the Great Vowel Shift (hereafter GVS).

4. NRP Vowel System

It is well known that diphthongs in British English, especially in so-called Estuary English spoken in London, have been shifting even after the GVS. They are far from intelligible for ELF learners.

(6) a. Estuary closing diphthongs²⁾

əɪ	əʊ
ʌɪ	ʌʊ
æʊ	ɑɪ

b. RP centering diphthongs

ɪə	ʊə
ɛə	ɜ:
	ɑ:

In the Estuary system in (6a), the high vowels /i(:)/ and /u(:)/ have been diphthongized into [əɪ] and [əʊ], which is the very process that once initiated the GVS. The starting points of /eɪ/ and /oʊ/ have been centralized, while /aɪ/ and /aʊ/ have undergone the phonetic development dubbed PRICE-MOUTH CROSSOVER (Wells 1982: 310). On the other hand, Received Pronunciation (or RP) contains centering diphthongs in (6b), which are not necessarily contrastive in other dialects.³⁾

Collins and Mees (2009) suggest that non-regional pronunciation (or NRP) should be a model for non-native speakers of English. NRP exhibits the following vowel systems:

(7) a. NRP checked vowels

ɪ	ʊ
e	ʌ
æ	ɒ

b. NRP free steady-state vowels

i:	u:
ɛ:	ɜ:
	ɑ:

Note that each system contains six vowels. Of the NRP checked vowels, /ɪ/, /e/, /ʊ/, and /ʌ/ have their long counterparts /i:/, /ɛ:/, /u:/, and /ɜ:/ as shown in (7). Approximately, NRP /ɪ/, /e/, and /ʊ/ correspond to Japanese short vowels /i/, /e/, and /u/, respectively.

It is extremely difficult for Japanese students to distinguish /æ/, /ɑ/ (= NRP /ɒ/), and /ʌ/, all of which

correspond to /a/ in their first language. Teachers are required to put special emphasis on the feature [−back] to help their students distinguish the front vowel /æ/ from the central /ʌ/. On the other hand, the feature [+round] of NRP /ɒ/ makes it sound like /o/ of Japanese, whereas the marked combination of features [+back, −round] of GA /ɑ/ leads to confusion of its phonemic contrast to the unrounded vowel /ʌ/. It follows that the NRP system of checked (or short) vowels is more intelligible for Japanese ELF learners. Teachers should indicate that there is a central vowel in English, which is not present in the Japanese vowel system.

To return to the system of free (or long) vowels in (7b), the mid front vowel /ɛː/ is a result of recent smoothing of the centering diphthong /ɛə/, while the mid back /ɔː/ is a result of recent merger between monophthongized /ɔə/ and /ʊə/. Consequently, the NRP system of diphthongs contains six elements as follows:

(8) NRP complex vowels

ɪə
eɪ əʊ ɔɪ
aɪ aʊ

The above system consists of the output of GVS, the borrowed diphthong /ɔɪ/, and the only remaining centering diphthong /ɪə/. Although the centralization of /ou/ to /əʊ/ is well known as a characteristic of British English, the feature [−back] of the first element is not distinctive in any dialect of English.

Kobayashi (2013) examines how accurately Japanese students can reproduce English words and sentences through dictation tests. The average percentage of correct answers is 57% in American English vs. 58% in British English, in contrast to 42% in Australian English. His target words in British English include vowel phonemes such as /ɒ/, /ɔː/, /ɛː/, and /əʊ/. The average reproduction rates of content words are as follows:⁴⁾

- (9) Br. /ɒ/ 67.2% (bottles, boxes, chocolate, cotton, doctor, shop, socks, stop, top; tomorrow; got, mop)
Am. /ɑ/ 39.2% (cotton; hotly; lost)
Br. /ɔː/ 47.1% (floor)
Am. [ɔɪ] 90.2% (forty; more)
Br. /ɛː/ 46.1% (chair, hair, pair; care, share, wearing)
Br. /əʊ/ 53.7% (boat, coat, home, load, loan, opening; know, rode)

The above evidence indicates that the roundness of British /ɒ/ in words like *socks* and *top* helps Japanese students distinguish the short vowel from /ʌ/ and /æ/, probably because loan words such as *sokkusu* ‘socks’ and *toppu* ‘top’ have entered in the Japanese lexicon with the back rounded vowel /o/. On the other hand, the smoothness of the centering diphthongs /ɛː/ and /ɔː/ reduces intelligibility because loans such as *hea(a)* ‘hair’ and *furoa(a)* ‘floor’ contain hiatus in the Japanese lexicon, which reflects rhoticity of American pronunciation [ɛɪ] and [ɔɪ]. The British diphthong /əʊ/ is more intelligible than expected though not learnable for Japanese students.

5. Discussion

The system of five vowels indicates that the native speaker divides the oral space into five in order to discriminate the meaning of at least five different words. A larger number of phonemes could help differentiate wider variety of items including loan words. However, the larger the number of vowels, the smaller the oral space available for each vowel, and the more difficult it is to distinguish adjacent vowels. According to Flemming (2001: 25), the selection of phonological contrasts is subject to three functional goals.

- (10) a. Maximise the number of contrasts (in any given context).
- b. Maximise the distinctiveness of contrasts.
- c. Minimise effort.

The selection of a set of contrasts involves balancing these three requirements, and different languages can reach different compromises, resulting in cross-linguistic variation in systems of contrast. Obviously, the more contrasting segments the inventory contains, the less oral space is given to each segment, and the distinctiveness of contrasts is reduced. Therefore, the system of five vowels is more intelligible and learnable than that of ten vowels for foreign students of the language. Collins and Mees (2009: 209) remark that foreign learners of English find it difficult to distinguish /i/ from /ɪ/; even German and Dutch students show confusion of crucial phonemic contrast between /e/ and /æ/.

We have seen in (4) that GA has nine simplex vowels to be distinguished, which means that 1/9 of the oral space is given to each vowel. The feature [\pm tense] does not help Japanese students distinguish /i/ from /ɪ/. On the other hand, NRP simplex vowels are divided into two systems as shown in (7) in terms of the feature [\pm long], which is intelligible and learnable for Japanese students. Each of the systems contains only six vowels, which means that 1/6 of the oral space is given to each vowel.

Remember that Old English (OE) exhibits a system of six vowels as follows:

- | | |
|-------------------------------|-------------------------|
| (11) a. OE short vowel system | b. OE long vowel system |
| i u | i: u: |
| e o | e: o: |
| æ ɑ | æ: ɑ: |

The short vowels in (11a) contrasted with their long counterparts in (11b) as in *god* ‘god’ vs. *gōd* ‘good’. After the length contrast was lost through the process of Open Syllable Lengthening in Middle English (ME), lengthened vowels as well as inherently long vowels underwent the GVS to be diphthongized in Modern English (ModE). The vowel length has thus been retained in the GA system of complex vowels in (5). In British English, a new system of long vowels cited in (7b) has emerged as a result of loss of rhoticity followed by monophthongization of centering diphthongs cited in (6b).

In sum, the NRP system of short vowels is more intelligible and learnable for Japanese ELF learners. Teachers should indicate that the English language contains a system of six vowels, and that length contrast enables the speaker to distinguish the meaning of different words. They should also indicate that there is a

/i:/, /u:/, /eɪ/, and /oʊ/ are the output of the GVS, while /a:/ and /ɜ:/ are a consequence of loss of rhoticity in late Modern English. Teachers should not encourage their students to try to be rhotic, because the post-vocalic [ɹ] is not distinctive in any dialect of the English language. To sum up, six vowels are sufficient to distinguish the meaning of different words in English.

Notes

- 1) To be more precise, the high back vowel of Tokyo Japanese should be transcribed into the unrounded /ɯ/.
- 2) The borrowed diphthong /ɔɪ/ is excluded from the vowel chart because it has not been involved in the diphthong shift.
- 3) Cruttenden (2014: xvii) has decided to replace RP with General British (or GB) in the 8th edition of *Gimson's Pronunciation of English*.
- 4) The average reproduction rates were calculated by the present author based on Kobayashi's data.
- 5) The mid central vowel /ʌ/ is a consequence of splitting in Modern English: the high back /u/ was lowered, fronted, and unrounded in words such as *come* and *cut*, while it remained /ʊ/ after labial consonants such as /p/ and /b/. The vowel in question systematically retains the unmarked combination of features [+back, +round] in northern dialects of British English, *come* and *cut* still being pronounced as [kʊm] and [kʊt].
- 6) Cruttenden (2014: 343–344) allows the vowel inventory to be reduced to five short and five long vowels, aiming at “minimal intelligibility in the use of English in international *lingua franca* situations.” In the five-vowel system, /ʌ/ is not distinguished from /ʊ/ just as in northern dialects of British English noted above.
- 7) Old English /ɑ/ was merged with /æ/ in Middle English. Present-day /ɒ/ is a result of lowering of Modern English /o/. Therefore, the feature [+round] is compatible with the orthography.
- 8) While ME /i:/ and /u:/ were broken into /əɪ/ and /əʊ/ around 1500, ModE long vowels /e:/ and /o:/ were diphthongized into /eɪ/ and /oʊ/ around 1800. In the United States, the more recently broken long vowels are conventionally transcribed into /e/ and /o/ in contrast to the simplex vowels /ɛ/ and /ɔ/.

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